No. 787,860. PATENTED APR. 18, 1905.

N. W. H. SHARPE.

EXHAUST MUFFLER.

APPLICATION FILED JULY 2, 1904.

FIG. 1.

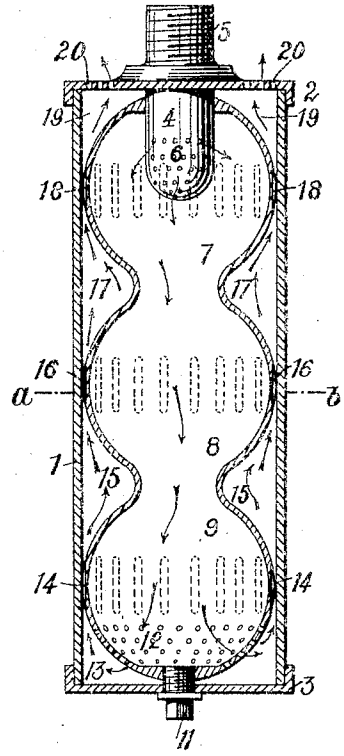


FIG. 3.

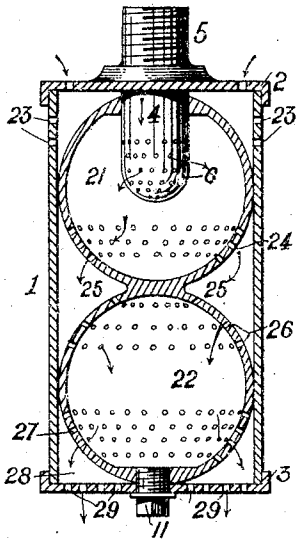


FIG. 5.

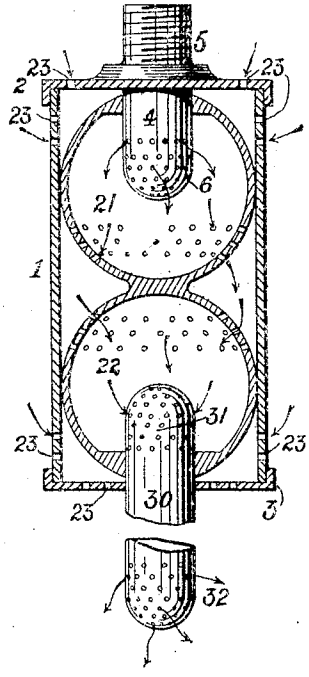


FIG. 4.

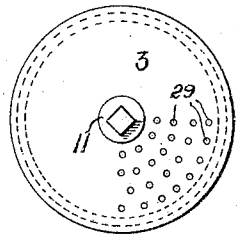
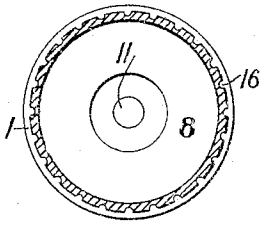


FIG. 2.



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No. 787,860. Patented April 18, 1905.

UNITED STATES PATENT OFFICE.

NATHAN WILLIAM HORATIO SHARPE, OF LONDON, ENGLAND

EXHAUST-MUFFLER.

SPECIFICATION forming part of Letters Patent No. 787,860, dated April 18, 1905.

Application filed July 2, 1904. Serial No. 215,163.

To all whom it may concern:

Be it known that I, NATHAN WILLIAM HORATIO SHARPE, a subject of the King of Great Britain, residing at London, England, have invented new and useful Improvements in Silencers for the Exhaust of Internal-Explosion Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

By my invention the volume of the exhaust-gases is broken up a number of times into small streams, and at each break up the streams of gases are partially cooled until the explosive character of the exhaust has become entirely exhausted and when escaping into the atmosphere is entirely noiseless and without explosive vibration. This result is obtained by the special construction of the apparatus hereinafter described, which is applicable to internal-explosion motors of any size.

To enable my invention to be fully understood, I will proceed to fully describe the same, with aid of the accompanying drawings, in which—

Figure 1 is a sectional view of a silencer according to my invention; Fig. 2, a cross-section on line *a b* of preceding figure; Fig. 3, a sectional view of a slightly-modified construction; Fig. 4, a plan of under cover of Fig. 3; Fig. 5, a slightly-modified arrangement of Fig. 3.

Referring to Fig. 1, the silencer consists of a tubular casing 1, of thin metal, with screwed on top cover 2, and bottom cover 3. Pendent from the under side of top cover 2 and cast in one piece with it is a short length of tube 4, closed at bottom. A part 5 of tube 4 projects on the outside of cover 2 for a union connection with the exhaust-pipe from engine. A portion of the inside part of tube 4 is closely perforated with a number of small holes 6. Within the tubular case 1 is fitted partially globular parts 7 8 9, cast in metal in one piece and communicating with each other. It will be obvious that the number of these globular parts can be increased or reduced without in any way departing from the invention; but the arrangement shown has been found to give good results. To strengthen the lower cover 3, the end of lower globular part 9 is somewhat thickened to engage a screw-plug 11 passing through cover 3.

The apparatus acts as follows: The exhaust from engine by being connected to outside part 5 passes down tube 4 and is broken up for the first time into a number of small streams by passing out through the small holes 6 into globular part 7, where it expands and partially cools by impinging against the wall of the globular part. It then passes into the next globular part 8, again expanding and partially cooling, and then passes into part 9, again expanding and partially cooling. It is then broken up into a number of small streams by passing out through the holes 12 into the space 13, where it expands and partially cools by impinging against the inside of case 1. It then passes upward and is again broken up into a number of small streams by passing through the grooves 14 on the outside of the globular part 9 into the space 15, where it expands and cools by contact with the inside of case 1, and is again broken up into a number of streams by passing through the grooves 16, on the outside of globular part 8 into space 17, where it expands and cools by contact with the inside of case 1. It is again broken up into a number of small streams by passing through the grooves 18 on outside of globular part 7 into space 19 and out into atmosphere through holes 20 in cover 2.

Referring to Fig. 3: In this modification the inside of the tubular case 1 is fitted with two complete and independent hollow metallic globes 21 and 22, cast in one piece. The bottom of globe 22 is secured to the cover 3 by the screw-plug 11. In this arrangement cold air can be admitted to the top of globe 21 to assist in cooling the same. This air comes in through holes 23 in casing 1 and cover 2. This arrangement acts as follows: The exhaust from engine passing down tube 4 is at once broken up into a number of small streams, as before described, by escaping throu h the small holes 6 into the larger interior of globe

21, where it expands and partially cools by impinging upon the side of globe. From here it is again broken up into a number of small streams by passing out of globe 21 by the small holes 24 into space 25, where it expands and partially cools by contact with wall of case 1. From here it is again broken up by passing through holes 26 in globe 22 into the globe, where it again expands and partially cools. From here it is again broken up into a number of small streams by passing out through the small holes 27 into space 28, and from here it is again broken up into a number of small streams by finally exhausting into the atmosphere through the holes 29 in cover 3.

Referring to Fig. 5: This relates to a modified plan for the final exhaust. In this plan an inclosed length of tube 30 is passed for a portion of its length through the cover 3 into globe 22, the inside portion being perforated with a number of small holes 31 and the outside portion with a number of small holes 32. When the exhaust arrives in globe 22, it is broken up by passing through the holes 31 and again by passing through the holes 32 into the atmosphere.

Having now described my invention, what I desire to claim is—

1. In a silencer for explosive-engines, the combination with a casing, of a plurality of intercommunicating expansion-chambers located therein, a closed tube projecting into one of said chambers at one end of the silencer and provided with a plurality of jet-orifices for receiving and discharging into said chamber, in finely-divided sprays, the exhaust from the engine, and means for discharging the spent gases from the last expansion-chamber of the series in finely-divided sprays.

2. In a silencer for explosive-engines, the combination with a casing, of a plurality of globularly-formed intercommunicating expansion-chambers, the walls of said chambers at their neck ends being spaced from said casing and forming therewith cooling-spaces between said chambers and said casing, a closed tube projecting into one of said chambers and provided with a plurality of jet-orifices, for receiving and discharging therein in finely-divided sprays the exhaust from the engine, and means for discharging the spent gases from the last expansion-chamber of the series in finely-divided sprays.

3. In a silencer for explosive-engines, the combination with a casing, of a plurality of intercommunicating expansion-chambers formed therein, means for delivering the exhaust from said engine into one of said chambers and breaking up the gases into finely-divided sprays, means for discharging the spent gases from the last expansion-chamber of the series into said casing in finely-divided sprays, and means for conducting said gases to the oppesite end of said casing between said chambers and said casing and discharging said gases into the open air.

4. In a silencer for explosive-engines, the combination with a casing provided with a top having a plurality of apertures therein, of a plurality of globularly-formed expansion-chambers within said casing provided with circumferentially-disposed series of longitudinally-extending grooves on their peripheral walls forming small passage-ways between said casing and globular walls, the neck portion of said globular walls also forming with said casing enlarged expansion-chambers, means for delivering the exhaust from said engine into one of said chambers, means for breaking up the exhaust-gases into finely-divided sprays, and means for discharging in finely-divided sprays the spent gases from the last expansion-chamber of the series into said casing.

5. In a silencer for explosive-engines, the combination with a casing provided with a top having a plurality of apertures therein, of a plurality of globularly-formed expansion-chambers within said casing and provided with circumferentially-disposed series of longitudinally-extending grooves on their peripheral walls forming small passage-ways between said casing and globular walls, the neck portion of said globular walls also forming with said casing enlarged expansion-chambers, and a closed tube projecting into one of said chambers and provided with a plurality of jet-orifices for receiving and discharging into said chamber, in finely-divided sprays, the exhaust from the engine, the last chamber of the series being provided with a plurality of jet-orifices for discharging the spent gases in finely-divided sprays into said casing.

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